

# POPULAR Computing WEEKLY

30 September 1982 Vol 1 No 24

35<sub>p</sub>

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# POPULAR Computing WEEKLY

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Published by Sunshine Publications Ltd.

Typesetting, origination and printing by  
Chesham Press, Chesham, Bucks

Distributed by S M Distribution  
London SW9. 01-274 8611. Telex: 281643

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You can have Popular Computing Weekly sent  
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Programs should, whenever possible, be  
computer printed.

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every submitted article, so please keep a copy.

### Accuracy

Popular Computing Weekly cannot accept any  
responsibility for any errors in programs we  
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make sure programs work.

## This Week



Cover illustration by Tooman Inkas

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## Editorial

Adventure games have a small but devoted following among micro-computer users.

Go to any micro exhibition and you will find a few intent individuals, oblivious to the noise of the surrounding *Space Invader* stalls, earnestly discussing the merits of their latest Adventure. Not for them the tests of co-ordination and reflex demanded by *Asteroids* and *Defender*. They are living in another world, literally.

Adventure games are a curious mix of puzzle and fantasy. The protagonist finds him, or her, self in a world that can range from Tolkien's *Lord of the Rings* to Clarke's 2001 *A Space Odyssey*. The object of the game is usually to find some hidden treasure or rescue an imperilled princess.

It is essentially a battle of wits — the player versus the author of the program. But, though adventure writers can be pretty devious, the clues to solving the game are usually there, if you look hard enough.

There is a feeling of tremendous satisfaction in solving an Adventure, or even part of one. It is a feeling that is deserved, since your success depends on your native wit, or your ability to cheat by looking through the program listing.

## Next Week



Can you drive your opponent into a corner? Find out in *Laserchase* — a new game for ZX Spectrum

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# Sinclair hopes to clear backlog

SINCLAIR Research remains confident that it will clear its Spectrum order backlog by the middle of October. This claim is made despite still lengthening delivery times.

Only about 25,000 of the 40,000 orders for the new machine have so far been fulfilled. Many customers for the 48K version have now waited longer than the 12-week delivery promise by Clive Sinclair in August.

A spokesman for Sinclair Research explained that most problems concern the 48K and

that delivery of the 16K is now down to 10 weeks.

Graham Tillman at Jaeserv, Sinclair's mail order company in Camberley, admitted the difficulties. "We were getting a 50 percent rejection rate for the 48K machines at quality control" he said.

"Design of the Ram expansion board caused problems. It has very fine tracks prone to breaking and shorting."

When the Spectrum printed-circuit board was redesigned by Timex in Portugal to correct initial design problems, the

opportunity was taken to incorporate the Ram expansion circuit into the main board. The Ram expansion now has 12 Ram chips which plug individually into sockets on the main board.

Stewart Crookshank, Production Manager of Timex Dundee says: "Production is increased with the new boards and we seem to have sorted out the problems. Some of the old boards are still going out (as 16K machines) but there will be no problems with upgrading."

Graham Tillman confirms that the first sizeable delivery of new 48K machines has been received at Camberley. He says: "We are confident of delivering a reasonable number of 48K models each week."

## Sinclair boosts school micros

MICROCOMPUTING in primary education is given a £15m boost in a scheme announced by Sinclair Research.

Under the offer schools taking advantage of the government's 'Micros in Primary' grants to buy a ZX Spectrum microcomputer will receive additional help from Sinclair.

Each of the country's 27,000 primary schools that chooses the Spectrum under the government scheme will also get a free ZX printer, Logo educational language and ten discount vouchers. Vouchers, worth a £45 discount or printer, may be used with further Spectrum purchases — one voucher per machine.

Clive Sinclair said: "Giving one computer to a school is a marvellous initiative. One computer per child is better than one per class, and our scheme will encourage a move in this direction."

## Software by cable tv

A CABLE television network, that will enable tv owners to access a vast database of software, could be in operation by 1985.

Such a system of software distribution was proposed by Kenneth Baker, the Information Technology Minister, speaking at the Edinburgh Festival tv conference. He said that a 30-channel system could be installed in half the country's homes in time for the introduction of direct satellite broadcasting early in 1985.

Decisions on the future of cable tv will be taken this autumn, based on the recommendations of the Hunt Inquiry — due to produce its report by the end of September. If cable tv gets the go-ahead the first networks could be licenced in 1983. The estimated £2½bn cost of the cable tv network would be raised through private enterprise.

## More programs for NewBrain

GRUNDY Business systems has launched a range of software to support its NewBrain micro.

French and German teaching and card index packages cost £4.95. A home-finance package and three games — Tycoon, Quadras and Space Battle all cost £9.95. A range of business programs including a mailing list package and a monthly accounts package cost £25.95.



Epson's HX-20 portable micro has 16K Ram and a 30x4 liquid crystal display.

## Epson (UK) to launch HX20 in November

EPSON (UK) launch a new portable microcomputer, the HX-20, in mid-November.

A compact unit weighing just over 3½lbs, it incorporates a true full-size keyboard, 16K Ram, dot-programmable 20 character x 4 line liquid crystal display (lcd), 24 column dot-matrix printer, microcassette drive and 50h Ni-Cad battery power supply. An adaptor allows mains operation.

The HX-20 runs the full range of Microsoft Basic commands and when connected to an external monitor will display colour. Memory space is divided into 5 partitions (with a sixth for assembler programs) accessed using a Login command. The lcd display can be used to view any portion of a virtual screen of up to 255 character width. The cassette drive is controlled from the keyboard using the Wind command.

The HX-20 has both RS232C and serial interfaces; the cassette drive uncups and can be replaced by a plug-in Rom cartridge. An expansion box can be attached to the left-hand side giving an additional 16K Ram and 16K Rom. There is also an 8K Rom slot underneath the machine for assembler programs.

Launch of the HX-20 will be at the CompeX UK show on November 16 to 19. A desktop version is being planned, to feature a built-in monitor and 5¼ inch disc drives.

Dan Diehlman, Epson's Sales Manager said "The HX-20 should go like a rocket. It marks the beginning, by Epson, of a long-term commitment to the manufacture of microcomputers." Complete with printer, micro-cassette drive and mains adaptor, the HX-20 costs £479, plus VAT. The expansion box costs £80 plus VAT.

## Competition winner



**BRAIN OF BRITAIN:** When Phillip Brain, winner of Popular Computing Weekly's Programming Award Scheme, gets his Spectrum prize it will be the first micro he has owned. He borrowed from a friend the ZX81 on which he developed his winning entry, *Odyssey*. Philip is 21 and since leaving school had until recently been unemployed. He is now a member of one of Sheffield's thriving rock bands. He said: "It was the first machine-code program I wrote. It was a friend who insisted that I enter it in the competition."

# POPULAR Computing WEEKLY

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# Letters

write to Letters, Popular Computing Weekly, Hobhouse Court, 19 Whitcomb Street, London WC2

## Screens—null string

When my ZX Spectrum finally arrived, I busied myself with trying to understand the wealth of commands (to a former ZX80 user), and not least how to get them out of the keyboard. In the end I reached the display file, which is arranged so horribly that the manual advises anyone to use *Print* at in place of *Poke*, and *Screens* in place of *Peek*.

In fact, the manual is very reticent about how *Screens* works — you have to search through Appendix C. The reason becomes clear when you start using it — although *Screens* will return the character at the specified line and column when its code lies between 32 and 127, it returns a null string for all graphics characters, including any user-defined graphics.

Now this seems to me to be rather a serious drawback in the command; surely it is in precisely the sort of situation that one would use user-defined graphics that one would need some way of checking the display — take any *Invaders*-type program, for instance?

On discovering this, my initial reaction (after fury, disbelief, muttered curses) was to get round the problem using *Over*.

If *Screens* returned a null string, the routine would print the graphics characters one by one over the relevant position, and then use *Screens* to check if the result was a space, in which case it was the correct character.

This, however, had two snags. It was fairly slow (up to a second or so), and it looked a little bit messy on the screen during execution. This latter effort is much better:

```
100 LET I=CODE SCREENS(Y,X):
IF I THEN RETURN
110 POKE 2386, PEEK 2387:
POKE 2387, PEEK 2387-I
120 LET I=CODE SCREENS
(Y,X)+112
130 POKE 2386,I: POKE 2387,80:
RETURN
```

Before calling the sub-routine you must define Y and X, the column and line positions of the spot you are checking. It works by temporarily making the Spectrum think the character set starts where the user-defined

graphics are located.

The disadvantage is that this does not recognise the pre-defined graphics, codes 129-142, returning 1=112 for all of them. However, these are such miserable graphics anyway, included more for ZX81 compatibility than for any innate value I should think, that this is not much of a handicap.

Hope this is helpful. My thanks to Sam Goodwin (*Popular Computing Weekly*, August 5) for the first article I've seen to tell Spectrum owners something they couldn't have read in the manual.

Dominic Ferard  
Sunningdale House  
Raby Road  
Stockton-on-Tees  
Cleveland

## Reviews unfair to Vic20

Why are your Vic20 program reviews almost always bad? The worst yet must surely be on the *Vicpendium 1*, by OPUS 2 software. I have had this cassette for three weeks and find it very enjoyable. *Gorgon's Tomb* plays well, even if it is based on a maze. Their *Othello* is not easily beaten — as they say, you have to keep your wits about you, for it plays a subversive game and will suddenly turn the tables on you. *Digitman* does not seem to do anything wrong, the error trapping seems quite good to me.

But it is the *Invaders* comment where you really show yourselves up. It is certainly not slow, especially at the end, and the 'oval blobs' you mention are very obviously not oval blobs at all, but well defined 'alien' characters.

Come on, *Popular Computing Weekly*. ZX's are not the only programs, nor the only computers in the world. What about admitting you might be wrong, for once?

P E Bagley  
33 Coldbeck  
Walshaw Abbey  
Essex EN9 1UR

We have never claimed to be infallible. We do make some mistakes, though we make every effort to avoid them.

However, software reviews depend largely on the taste of the reviewer. What appeals to one reviewer may repel

another and vice versa. Borts Allan, who reviewed *Vicpendium 1*, was not impressed and felt it was heavily over-priced.

But, I am glad to report that T P Watts of Opus 2 Software has dropped the price of *Vicpendium 1* by £1 from £7.95 to £6.95. The *Invaders* program, which was written in Basic on the version we reviewed, has subsequently been rewritten in machine code.

Mr Watts also felt that we had been unfair in our review of *Vicpendium 1*. Perhaps other readers would like to add their comments?

## Spectrum bug found

R Ian Logan's "Spectrum Bugs wasted". Try this: either *Chs:Print Chr\$ 8;* "8" or *Print at 0,0; Chr\$ 8;"8"* will print a graphics shift-8 blob midway down the right side of the screen, and overwrite part of a program (one byte).

Dilwyn Jones  
Fodol Farm  
Hafod Lane  
Caernarfon Road  
Bangor  
Gwynedd  
North Wales LL57 4BU

## What's your number?

Like Bill Longley (*Popular Computing Weekly*, August 19), I too attempted to convert David Lawrence's excellent renumbering program to run on the Spectrum, though without the same degree of sophistication as Mr Longley's version.

However, there were one or two points I came across which may be of interest to Messrs Lawrence and Longley, and other readers as well.

Firstly, I found I had to cope with a Rescore statement. To do this I changed line 9967 to:  
IF PEEK I=280 OR PEEK I=236 OR PEEK I=237 THEN GOSUB 9971

Secondly, I was not too happy about *Let X1=25755* in lines 9960 and 9977. I felt, perhaps mistakenly, that this might lead to problems when we all have Microdrives. I went to the system variables where I found (manual page 174) *Prog* at byte 23635. I therefore *Let X1=Peek 23635+256\*Peek 23636*.

Lastly, if you add a *Beep* statement in lines 9973 and

9980, you can change channels while this program is running and watch the box:

9973 BEEP 3.3: STOP  
9980 IF LINE=9980 THEN BEEP 3.3: STOP

A J Clavier  
10 Carnarvon Road  
Barnet  
Hertfordshire EN5 4LU

## No more requests—please

Since the appearance of your *Sinterview* with me, *Popular Computing Weekly*, July 1, I have been swamped by requests for information about the Sinclair Amateur Radio User Group. So much so that I regret I am forced to cease my activities in this direction as soon as I conveniently can. This is brought about by several factors:

First — the totally excessive demand for information.

Secondly — the inability of most members to grasp the main reason for our existence as a group. Via the *Sharing* of experience, information, programs and ideas in our chosen field of activity. Everybody wants but very few give.

Thirdly — as you know I formed the group as a voluntary, non-profit unit and continue to operate it as such. The burden of doing so and trying to give "value for money", especially in view of the scarcity of members input, is more than I am prepared to take.

I wonder therefore if you would be kind enough to publish a notice to the effect that no further enquiries can be dealt with in respect of SARUG. I would appreciate your assistance.

Congratulations on the continued improvement in *Popular Computing Weekly's* quality.

Paul Newman  
3 Red House Lane  
Leiston  
Suffolk IP16 4JZ

Paul Newman has been inundated with enquiries since our interview with him was published on July 1. He has asked us to inform our readers that he cannot cope with the massive response generated by the interview and would be grateful if people stopped trying to contact him.



# Tunnel

A new game for 16K  
ZX81 by Brian Hubbard

In this fast moving program you are at the head of a team of four space craft exploring one of two tunnels on an alien planet. You have to guide them through without hitting the sides of the tunnel.

Each of the four space craft are fitted with automatic lasers that will destroy any rocks directly in front of each ship, but the lasers use 10 times more fuel than the propulsion system. If you hit too many rocks your team will run out of fuel and be killed.

You have two controls, up and down, which are the keys 8 and 7. The other three space craft in your team automatically follow every move you make.

You start with 2000 units of fuel — the amount left is continuously displayed. A successful mission through the tunnel without hitting anything at all takes 1000

units of fuel, so you have 1000 units spare for the lasers.

When run, the program will give you instructions and ask you to choose which tunnel you wish to take. The computer will then go into fast mode and the basic program will store a random tunnel in the memory. You will see your team of space craft on the left-hand side of the screen with the tunnel entrance moving across the screen from right to left. Your team will be at the correct height for the tunnel entrance. The whole screen, including the 22nd and 23rd lines, will be taken up by black rock with a white tunnel running through it.

At the end of the game, you will be told whether or not it was a successful mission. You will then be asked whether you want to go through a new tunnel, in which case

the program will re-run, or whether you want to go through the same tunnel again.

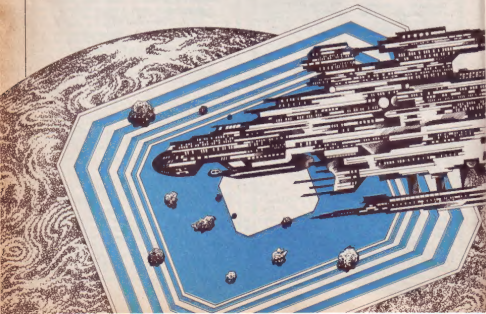
Line 1 holds the machine code program.  
Lines 10 to 24 give the instructions.  
Lines 25 to 70 set the width of the tunnel.  
Lines 80 to 92 give you further instructions.  
Lines 100 to 130 set up a list of 1000 numbers between 0 and 255, which is used by the machine code program to form the tunnel. The numbers refer to the distance of the tunnel from the top of the screen.  
Line 128 points stop code for machine code to recognise the end of the tunnel.  
Line 136 prints your starting fuel level. This can be changed provided you keep to a four figure number printed at the same position.  
Lines 137 to 150 set up variables for use by the machine code.  
Line 185 starts the machine code program and decides whether you ran out of fuel or reached the end of the tunnel.  
Lines 190 to 210 are comments on your performance.  
Lines 220 to 270 re-run the program or run the same tunnel again.

## Basic variables:

- W — input which tunnel you want to take.
- T — width of tunnel, can be changed for any width.
- A — distance of tunnel from top of screen.
- F — addresses where random numbers for the tunnel are stored.
- S — height of space craft at the start of the program. Notice that  $S = A$  at the start of the program so that the tunnel entrance and the team of space craft are all the same height to start the game.
- AC — input whether you want to re-run the same tunnel or try a different one.

## Entering the program

First, put in the machine code program. To do this, type in the short decimal machine code loader program. Next, type line 1 rem followed by 237 "X" characters. It is important that the correct number of characters is used, or the computer may crash. To check you have the right number of char-





acters, Print Peek 16751. The answer should be 61, if not you need more characters. If Peek 16752 is not 118, then you need fewer characters.

When you have the right number of

characters, run the program. You will probably want to run it in Fast, to cut down the time it takes to type in all the numbers listed. When you have finished typing in all the numbers, you can check that they are

all correct simply by putting in the decimal machine code checking program without deleting line 1. The program will list all the numbers you have entered. If they are all correct, enter the main program.

```

2 REM ALL COPYRIGHT RESERVED
3 U HUBBARD 1982
9 CLS
10 PRINT "YOU ARE AT THE HEAD
OF A TEAM OF SPACE CRAFT EXPLOR
ING A TUNNEL ON AN ALIEN PLANET"
20 PRINT "EACH SPACE CRAFT HAS
HIGH POWER AUTOMATIC LASERS WHI
CH WILL DESTROY ALL ROCKS IN
FRONT OF THEM"
21 PRINT "THEY USE TEN TIMES M
ORE POWER THAN THE PROPULSION SY
STEM"
22 PRINT "BUT YOU ONLY HAVE 10
00 SPACE UNITS FOR THE LASER
S TO USE"
23 PRINT "YOU CAN TAKE ONE OF
TWO TUNNELS. TUNNEL 1 HAS A WID
TH OF THREE SPACE CRAFT AND TU
NELL 2 HAS A WIDTH OF FIVE S
PACE CRAFT"
24 PRINT "PRESS WHICH TUNNEL Y
OU WANT"
25 INPUT U
30 IF U<1 AND U>2 THEN GOTO
9
40 IF U=1 THEN LET Q=3
50 IF U=2 THEN LET Q=5
60 POKE 16532,Q
70 CLS
80 PRINT "YOU HAVE APPROX. 45 S
ECONDES TO PREPARE YOURSELF"
91 PRINT "YOUR CONTROLS ARE""
--FOR DOWN ""7""FOR UP AND NO
KEY FOR ""STRAIGHT""
99 FOR Q=0 TO 300
91 NEXT Q
92 CLS
93 LAST
100 LET A=10
101 FOR F=30000 TO 31000
110 LET A=A+INT (RND*31-1
115 LET B=B+(A*Q)-(A*20)
120 POKE F,A
125 NEXT F
130 POKE F,255
135 SLOW

```

```

136 PRINT AT 0,0;"FUEL=2000"
137 LET S=10
138 POKE 20000,S
140 POKE 20010,53
150 POKE 20011,7
155 IF USR 16514<0000 THEN GOT
O 200
160 PRINT AT 0,0;"
165 GOTO 250
170 PRINT AT 10,1;"
175 GOTO 250
180 IF U=2 THEN PRINT "
185 GOTO 250
190 PRINT "
195 GOTO 250
200 INPUT A$
210 IF A$="C" THEN RUN
220 IF A$="A" THEN GOTO 250
230 IF A$("R" AND A$("D" THEN
GOTO 250
240 CLS
250 GOTO 130

```

#### DECIMAL MACHINE CODE CHECKING PROGRAM

```

10 LET X=16514
11 SCROLL
20 PRINT X;" = ";PEEK X;" = ";
CHR$ PEEK X
30 SCROLL
40 LET X=X+1
50 GOTO 20

```

#### DECIMAL MACHINE CODE LOADER PROGRAM

```

10 LET X=16514
20 INPUT A
30 POKE X,A
40 PRINT A
50 LET X=X+1
60 SCROLL
70 GOTO 20

```

17 - 16514	40	6	40	237	12	184	78
31	6	94	2	75	64	86	75
9	94	128	24	32	35	221	179
42	128	25	242	78	35	42	190
58	25	13	35	175	35	32	32
117	13	24	247	35	185	25	78
35	24	247	35	40	35	1	4
205	247	42	3	4	35	254	62
58	237	12	3 - 16615	25	35	239	24
117	75	64	3	13	35	237	100
78	48	37	20	24	25	60	32
62	117	33	0	249 - 16645	46	203	39
205	187	0	28	54	62	93	6
185	184	25	62	18	20	37	112
200	40 - 16559	17	23	0	186 - 16603	1	196
0	4	0	187	0	40	35	130
0	25	0	2	0	62	64	1
4	5	35	2	35	62	254	1
5	24	68	24	78	20	239 - 16718	15
237	240	77	228	62	185	237	39
67	193	0	42	128	32	203	201 - 16751
48	129	10	12	6	5	203	
117	129	119	64	1	54	90	
42	79	175	35	185	37	32	
12	62	7	35	32	43	1	
64	21	35	35	4	24	43	
25	145	3	25	35	240	34	
10	75	20	25	8	21	32	
19	175	62	17	6	114	78	
175	185	30	33	10	5	23	
185	43	186	0	42	175	32	

# Mysterious Adventures

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### SPECTRUM SOFTWARE WANTED

## Lynx: putting the cat among the pigeons

David Kelly talks to John Shirreff and Davis Jansons, co-designers of the Lynx.

The Lynx is a new low-cost micro from a Cambridge-based company, Computers. As the custom for British micros these days it has two designers.

John Shirreff and Davis Jansons, responsible for the hardware and software respectively, make an unlikely team. All they have in common is their Cambridge education, a sense of humour, and the Lynx.

John is substantially the elder of the two. He originally studied architecture, but admits to being something of an ageing hippy — a much travelled, soft-spoken, character who likes the Cambridge environment. He worked for GW Design Services, a sister company of Computers, before designing the Lynx. While at GW he worked on a project to develop a Z80-based business micro.

Davis is an intense 23-year-old with a quick grin. He studied mathematics at college and began Z80 programming as a part-time enthusiasm. He is a confirmed vegetarian who joined GW in the spring of this year.

Dick Greenwood, a director of GW Services, first had the idea of making a low-cost micro in March 1982. The company conducted a public opinion survey to find out where most micros fall down and how they could make a better one. From the poll it was decided that the Lynx should have at least 16K working Ram, colour, hi-resolution graphics, Basic, a full-size keyboard and potential for expansion.

With this brief, John and Davis began work on the Lynx in May this year.

John explained how he went about the design of the hardware. "There are pros and cons to being a hardware person. I get the lead lumes from the solder. Davis gets to sit in front of a VDU all day.

"At first I sat in the garden and thought about the possibilities. Then I did a timing diagram to see if it would work. The whole design philosophy was linked to expandability — particularly now that memory is becoming so cheap.

"The main difficulty with the design was its memory banking arrangement. I think we have developed a convenient and unconventional system which has many speed and software advantages. The expanded Lynx has 64K of video space and 64K of work space with 24K of Rom. The machine has been designed to switch memory in 64K blocks — larger units than most micros.

"There are problems switching 64K units on the Z80A — you end up switching



John Shirreff — originally studied architecture.

the section you are executing. But, there are new ways round these problems. Because of its memory banking the Lynx can run CP/M®. Most low-cost micros will not run CP/M® because the Rom gets in the way.

"This sets the Lynx apart from other micros making it much more flexible. You can keep hanging on extra 64K blocks of memory indefinitely.

"If the Lynx is used as a graphics terminal for a main-frame — for which it is well suited — you can dump a screen full of information into the work space, manipulate it, and put it back. The Z80 is a very good processor with a long future, particularly for file manipulation. The snag is that it doesn't have a fixed access-time, but the Lynx gets round this.

"The expanded version has a bit-mapped hi-resolution display of 512 x 248. Each dot is accessible and colour programmable, with 16K per colour giving the 48K of video memory. This makes the display flexible. You could even add on a

parallel video bank to give a grey-scale.

"Once I thought it through, the actual design only took about three weeks. The first prototype was completed in early July and we now have the finished product, ready for launch in late October. I suppose it has all gone quite smoothly. At least, it does pretty much what I said it would."

Davis explains the software. "We wrote an entirely new Basic version for the Lynx. Most of it was written by me but the screen display driver was written by two other people — Shane Voss and Fiona Miller.

"When I started I worked out I had 10 weeks to complete it — six weeks to write



Davis Jansons, software designer.

it and four weeks to de-bug it, tidy it up and make it consistent throughout." Both John and I have been working more than your standard 40-hour week — but never more than 90!"

Lynx Basic has been designed so that it is easy to modify. All the functions, commands, keywords and syntax checking are in tables held in Rom, but their pointers are kept in Ram. If you do not like one of the commands, or you want it to be more powerful, you can alter it.

Other features of the Basic are its optional single-keyword entry. You can type all the commands in full. Alternatively, you can use one key together with the Escape key. For example, Escape 9 gives Goto, Escape 1 gives Until, and so on.

"The Goto Label function seeks out a labelled line, without looking at the line numbers, which simplifies programming. The Code function allows machine-code to be entered easily.

"The statement is directly followed by the hex arguments and is ignored by the Basic program. The machine-code is then executed by Call Location which hunts out the Code function. The Lynx also includes a machine-code monitor for de-bugging machine-code programs."

To produce a completely new micro in 12 weeks is fast work. Both John and Davis are about to take short holidays.

After the break John will be back to work on the disc drives, which have to be finished by November, and Davis begins work on an enhanced Level 2 Basic which is planned for Spring 1983.



Computers' Lynx with typewriter-style keyboard.

# Return of the prodigal son

# Reviews

NewBrain



**Paul Kriwaczek compares the NewBrain with the BBC micro.**

Hello NewBrain, nice to see you at long last. Now don't just sit there on the table looking so smug. I remember when you were no more than a gleam in Uncle Clive's eye.

Of course, a lot has happened to you since then. Nearly aborted directly after conception, and then adopted twice by different step-parents. You were chosen for elevation to the priesthood as the BBC micro and then summarily defrocked. In the meantime, Clive gave birth to three legitimate computers of his own. Still, you're here now, so let's see what kind of a machine you've turned out to be.

What is uppermost in many people's minds is how you compare with Acorn's version of the BBC micro. So here we go.

An attractive box — plastic, but quite tough and sturdy — in a rather pleasant colour combination, cream and brown, with the NewBrain logo printed in script at the top left. This is considerably more attractive than the lund orange ivory in which I last saw NewBrain lurking. The lack of weight is quite surprising — 3lb according to my kitchen scales — but unlike NewBrain's stepbrothers from Sinclair, it has a feeling of quality about it. No executive briefcase would be embarrassed to contain it. And the small size is really remarkable — the BBC micro-computer is a giant by comparison. But then much of the expansion capability of the Acorn is already inside the box.

The connectors on the back of the NewBrain convey a message of quality too. They are small and elegant, adding

little to the bulk of the box, and seemingly an industrial precision connector system. Unfortunately, this means you won't be able to connect anything to the NewBrain unless you get it direct from its manufacturer — or are in on the secret of where to get suitable plugs.

The connectors link the machine to power input, two cassette recorders (each with its own sensitivity adjustment), modem, printer and bus expansion for all the promised add-on modules. Output to the screen display is from two normal phone sockets, one for a tv and the other direct video to feed a monitor.

The keyboard, standard QWERTY configuration, is what one might call up-market calculator-style — something between Spectrum and IBM — but arranged with keys the standard distance apart. At first sight, all the usual keys seem to be there. It takes some time to realise that there is neither a backspace nor a reset key. But, in return, we have an intelligence test — something labelled "Video Text" (to which there is no reference in the manual and which does nothing noticeable to the display).

Good for word processing? I asked two secretaries of my acquaintance. No, they said. The keytops are too small — you'd keep getting your fingers stuck between them if you tried touch-typing. And the 'return' and 'shift' keys are the same size as the others — very easy to miss.

By comparison, the BBC micro's keyboard is more convenient to use. But, though the BBC keyboard is larger, it too does not have a real quality feel to it.

But what the NewBrain does have, which makes it unique so far, is a built-in single line 'vacuum fluorescent' display,

mounted at the top right of the box. This means that it can be used out of reach of a tv set or monitor, and even out of reach of a mains supply, provided you have the version with the added rechargeable batteries — and don't want to use it for more than 75 minutes.



Paul Kriwaczek, Producer of the BBC's Computer Programme first shown earlier this year.

Only one small matter detracts from the smart executive jet-set image. The small matter of the power supply. Small but heavy — heavier in fact than the computer itself; a nasty brown metal laboratory-style unit. Here is something you would not wish to carry around in your briefcase, not for long, anyway.

Another minor foible: there's no on-off switch. So for safety it has to be unplugged when not in use. It tells you so on the label right next to where it says "For Indoor Use

Only, I notice that the power supply doesn't feature in the glossy advertising photographs.

So, connect it to the tv, plug in the power supply and what happens? Nothing. It starts with, for what seems quite a long time. Wait a minute, the tv may be blank, but something is happening to the single-line display. What is it? It is garbage, 10 seconds' worth. And then just when you start to wonder "ah! I bang it?" — standard diagnostic treatment for hi-tech apparatus — the single line display clears and the tv states: "NEWBRAIN BASIC READY".

Now is the time to start studying what is known in the jargon as the documentation, the instruction manual. It looks good, ring bound, glossy covered, 204 pages of it. But it is not good. It is awful.

Mind you, a properly produced handbook would have deprived me of a good many laughs. Here's my favourite, from the bottom of page 92: "The user should type in the following carefully," it says, "although the effect may not be seen until it is completed." And that's it! It says. Not a word more. It is followed by a blank space. Maybe it only appears in the handbook after you have completed typing whatever is into the machine. Or maybe they meant you to read on to the next page. Who can tell?

But the instructions to load a program from a tape are reasonably clear. So let's do it. Here's a NewBrain demo tape, supplied with the machine. Plug in cable between computer and recorder, type Load, run the tape and Hey Presto, it works — almost.

What's this? 'Error 131'. Look it up in Appendix 1; 8 pages of error numbers. At the bottom of the seventh, here we are:

NewBrain, showing at top left of picture a so far unique built-in single line 'vacuum fluorescent' display. All the ports are located at the back, including the connector for the power pack. The keyboard has a standard QWERTY configuration, but there is no backspace or reset key.

Error 131 — "Tape read error: attempt to read block into a buffer which is too small, or hardware failure." (I don't understand what it means about the buffer, so try again. Still no good? Oh well, cassette systems are always a little prone to failure.

I'm afraid that the NewBrain does not give a very user friendly first impression. Here the BBC micro impresses as being more appropriate to the beginner. There is no question but that the operating system is one of great sophistication, but the very power of the device makes it more difficult to choose how to use it.

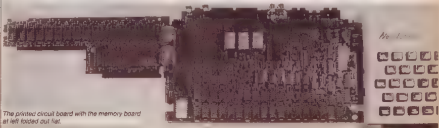
To start with, there are a number of different type-faces which can be called up by the touch of a button. The problem is finding which button. The user manual tries to make it clear, but one false step, easily achieved, and the machine becomes insensible to your input, responding whatever you type with error messages in Greek. (Yes, a Greek alphabet is one of the options.)

For those with systems experience, the powerful way the NewBrain handles its

input, output and files — as data streams all of which look identical to the operating system — will be very attractive. For beginners, who merely wish to use the high-resolution graphics, it will not be easy to cope with this sort of explanation in the user guide: "As the graphic stream is 'parasitic' upon the linked stream given as this parameter, it cannot function after that stream has been closed (even by an OPEN# 0 implicit close) and must therefore also be closed." This is a shame because the graphics software is very powerful indeed, giving far greater control, albeit as yet only in monochrome, than BBC Basic does over a screen of equivalent resolution.

The rest of the NewBrain Basic is, however, a disappointment. It is billed as enhanced ANSI and is unusual in being an interactive compiler. This means that on going through the Basic program the statements are all first translated into machine code and then run, unlike an interpreter,

turn to page 20



The printed circuit board with the memory board at left folded out flat.

# Open Forum

*Open Forum is for you to publish your programs and ideas.*

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(The usual fee is £10.)

**Presentation hints**

Programs which are most likely to be considered for the Program of the Week will be computer printed and accompanied by a cassette.

The program will be well documented, the documentation being typed with a double spacing between each line.

The documentation should start with a general description of the program and then give some detail of how the program has been constructed and of its special features.

Listings taken from a ZX Printer should be cut into convenient lengths and carefully stuck down on to white paper, avoiding any creasing.

Please enclose a stamped, self-addressed envelope.

### Minivaders

## on Spectrum

Imagine that you are the sole defender of your planet, having at your disposal 3 mobile missile launchers and 100 missiles. The Minivader Fleet Commander with 50 spaceships has been ordered to invade your planet.

He sends them in one at a time. The first 25 are from high altitude, but the others can surprise you. The spaceships are equipped with:

Bombs (Type A) Specially designed to melt missile launchers.

**Bombs (Type B)** These explode to leave craters you can't get your missile launcher past.

A radiation diffuser which at close range will destroy your defence shields, invisibility screens.

Both types of bomb will also damage your defence shields. Type **B** bombs fill in the craters left by Type A bombs.

Although the bombs appear random, some are very accurate, so keep moving. You can move when a bomb is being dropped but you can't fire.

**Program notes:**

Key: 0 To fire missile  
1 To move left  
2 To move right

LINE 2000 move launcher and check for missile firing

4000 flight of spaceship, check for hits and update.

[illegible]

5000	drop bomb
6000	set up screen
8000	and game
8500	instructions
9000	USA graphics

a	gun position
high	best score so far
hits	number of speeches destroyed
missiles	number of missiles remaining
lives	number of launchers left

ALL As, Bs, Cs are graphic  
LINE #320 - 32 spaces

Hits and highest score are shown at top of screen and the number of launchers left flashes at bottom right.

[illegible]

## Open Forum

from previous page

[illegible]

## Minivaders

by Keith Rylatt

## Pathfinder

1000

Pathfinder is a game involving quick thinking and accurate aiming. It's written completely in Basic for the ZX81, but runs surprisingly fast due to the extensive use of direct manipulation of the display file by *Peek* and *Poke* commands.

Instructions are given in the program but the aim is to hit as many "X" targets as possible by shooting your star around the screen with the cursor keys. If you crash into a user-defined "X" target, the boundaries of your own star—the game is over and your scores are printed. On-screen scoring and a three-level delay factor have been programmed and included.

It requires a minimum of 5K memory  
My record score is 48 targets on delay  
factor 0.

```

1  REM *****
2  REM *****
3  REM *****
4  REM *****
5  REM *****
6  REM *****
7  REM *****
8  REM *****
9  REM *****
10 REM *****
11 REM *****
12 REM *****
13 REM *****
14 REM *****
15 REM *****
16 REM *****
17 REM *****
18 REM *****
19 REM *****
20 REM *****
21 REM *****
22 REM *****
23 REM *****
24 REM *****
25 REM *****
26 REM *****
27 REM *****
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83 REM *****
84 REM *****
85 REM *****
86 REM *****
87 REM *****
88 REM *****
89 REM *****
90 REM *****
91 REM *****
92 REM *****
93 REM *****
94 REM *****
95 REM *****
96 REM *****
97 REM *****
98 REM *****
99 REM *****
100 REM *****

```

### Dragon Tip

on Dragon 32

This program makes use of the fact that the machine will Load and Skip from within a program. It would normally be used as an index on a tape with finished programs. It takes less than half a minute to load, and saves the tedious use of the Skip command in locating a program.

Lines 19-29 Clear the screen

Lines 30-70 Read and display the contents of the data of screen.

Line 64 is a loop to slow the display down and is not needed if the tape has less than 10 programs on it.

The gap between lines 100 and 500 is for the addition of Data statements. A typical line would read, 100 DATA "(1) SPACE INVADERS"

Line 500 is an empty string, to branch the program using the 500th line 60000

Line 519 waits for you to continue, and could be replaced by an `infix`.

Line 529 deletes the program up to and including line 530.

Lines 60000-60050 skip the programs and load the one that you choose. Then delete themselves.

leaving only the required program in memory.

This will only, of course, work for programs numbered below 60000, but the

[illegible]

program can be relocated in any position to suit. A Run command could be added at line 60060, and the program will self execute on completion.

```

10 REM INDEX=
20 CLS
30 FOR A = 1 TO 100
40 READ AS: PRINT AS
50 IF LEN(AS) < 1 THEN GOTO 60000
60 FOR Z = 1 TO 1000: NEXT
70 NEXT A
8000 DATA ""
810 LINE INPUT "PRESS ANY KEY TO CONTINUE": Z$
820 DEL 10 - 820
83000 INPUT "NUMBER OF PROGRAM REQUIRED": N
84000 FOR A = 1 TO (N - 1)
85000 GOTO
86000 NEXT A
87000 CLOAD
88000 DEL 85000 - 88000

```

The program, if entered as set out, will work for any length of tape, but if the program contents exceed, it will scroll and display the last 10 lines. Line 500 must not be left out, otherwise the program will stop with OD in line 40 (out of data).

Provided that enough space is left at the beginning of the tape, data lines containing extra programs can be added up to a maximum set by line 30.

## Snatch

on Spectrum

Whilst looking for new ideas for computer games, I thought of combining Space Invaders with the fairground Hock

[illegible]

machine, where you have to try to grab prizes with a large claw. The game I came up with is called *Snatch*, and is a cross between the two.

The listing contains a full set of instructions and *Rem* statements to tell the user what the computer is doing.

[illegible]

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### PROGRAM OF THE WEEK

### PROGRAM OF THE WEEK

[illegible]

## on Vlc-20

This is a space invader game with a difference. At any one time three invaders pass in front of you from the top of the screen (each having a different score value) and which you simply have to shoot. You can shoot the alien when it appears

anywhere in the sight.

BUT beware, there are six invisible black holes in front of you. You will be sucked into the black hole when the centre of the sight passes over one of these holes. Should you fall into a black hole then all accumulated scores are lost!

You have a limited amount of ammunition and a limited amount of time to shoot as many invaders as possible. At the top of

the screen the running score and elapsed time is shown.

A good average for the game is 100. The best score for the game so far is 240. All keyboard directions are shown in the instructions.

The program runs in a minimum of 6.5K and can also be used without any modification with any memory above that level. All subroutines are covered in the program listing by Rem statements.

```

445 E(D)=INT(RND(1)*400)+J1
446 NEXTD
447 REM SIGHT MOVEMENT
448 T1E="000000" IVAR=99,99:IGOSUB470:IVAR=0
449 GETS4:IPOKES199,0
450 PRINT"@"TAB(12)"TIME:"HID4(T1E,4,1)".
      "RIGHTS(T1E,2)
451 IF T1E=">"000200" THENHE47=1:IGOTO20000
452 IF T4<1 THENH490
453 IF S4=" " THENH500
454 IF S4="K" THENH500:UB6000
455 IF D1=99,99 THENH7=99,99:IGOSUB7000:IGOSUB469:
      V7=0:IGOTO491
456 IF S4=" " THENH500:UB6000:IS4=22
457 IF S4="J" THENH500:UB6000:IS4=1
458 IF S4="L" THENH500:UB6000:IS4=1
459 IF S4="H" THENH500:UB6000:IS4=22
460 FORD=1 TO 6:IFS=E(D) THENHE7=2:IGOTO20000
461 NEXTD
462 IFS4=J4 THENH5=J4
463 IFS4=J5 THENH5=J5
464 REM DRAM, SIGHT
465 POKES=1,67:IPOKES=1,67:IPOKES=22,66:
      POKES=22,66
466 POKES=23,122:IPOKES=21,76:IPOKES=23,79:
      POKES=21,98
467 IF V7=99,99 THENRETURN
468 IF V4=99,99 THENRETURN
469 IGOTO500
470 PRINT"@"TAB(12)"TIME:"HID4(T1E,4,1)".
      "RIGHTS(T1E,2)
471 OI=0
472 REM ALIAS MOVEMENT
473 #DIO=1703

```

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**Black Hole**  
by Neil Eckerstein

## Moon Lander

on BBC Micro

In this version of "Lunar Lander", for the Model A, you are the pilot of a descending moon shuttle, low on fuel and desperate to land. The landing pad is clearly defined

and is at the bottom of a precipitous valley. "Z" and "X" control horizontal drift and "H" controls descent rate. Time, fuel and drift are displayed at the top of the screen. An added difficulty is that drift has to be less than +/-5 to avoid total annihilation on landing.

The combination of mode 5's colour and graphics is used to its full. VDU 23 ... is

used to define the space shuttle and remove the omni-present flashing cursor. VDU 5 allows text to be used in graphics mode with high resolution manoeuvrability.

This means the shuttle can move one row of pixels at a time. Sound effects are incorporated in the listing and *Rule Britannia* is played after a successful landing.

```

10 REM*****
20 REM** MOON LANDER **
30 REM** (C) P.D. 1982**
40 REM*****
50 X$="M O O N L A N D E R":MODE7:VDU23;B202:0:0:0:PRINTAB(7,10):CHR$
&B2:CHR$14:;X$:
60 PRINTAB(7,11):CHR$B2:CHR$14:;X$:TAB(4,16):;"Z=LEFT JET: X=RIGHT JET:
Y=ROCKETS"
70 PRINTAB(3,19):"MAXIMUM VELOCITY WHEN LANDING=5":TAB(4,23):"Press the
SPACEBAR to continue":REPEATUNTILGET=32
80 MODE5:VDU23;B202:0:0:0:VDU5:ONERRDRUM
90 VDU19,3,6,0,0,0
100 SCOL0,3:FORX=0TO40:PLDT69,RND(1280),RND(400)+510:NEXT:BCOLO,2
110 MOVE=200,0:MOVES00,0:PLDT85,100,700:MOVE300,200:MOVE400,50:PLDT85,35
0,400:MOVE100,500:MOVE250,400:PLDT85,220,720
120 MOVE780,0:MOVE1480,0:PLDT85,1180,740:MOVE1000,0:MOVE780,0:PLDT85,900
,600
130 MOVE900,200:MOVE1280,200:PLDT85,RND(50)+550,RND(30)+560:MOVE500,0:MO
VE300,100:PLDT85,RND(100)+500,RND(35)+400
140 VDU23,255,0,0,0,0,255,255,255,255
150 VDU23,226,126,129,153,165,165,153,129,126:VDU23,227,24,60,126,126,12
6,126,90,24:VDU23,228,0,0,0,0,0,0,0,0,0
160 VDU23,225,60,126,90,126,255,153,18
170 VDU23,240,16,32,64,255,255,64,32,16:VDU23,241,8,4,2,255,255,2,4,8,1
VDU23,242,24,24,24,24,153,90,60,24
180 SCOLO,1:MOVES48,32:PRINTCHR$255:CHR$255:CHR$255
190 SCOLO,3:MOVE0,910:DRAW1280,910
200 X=RND(1000):Y=RND(1200)+700:FU=250
210 #FX11,1
220 #FX12,1
230 VV=0:NV=RND(20)+10
240 A$=INKEY$(0):VV=VV+1:F=0:J=0
250 VDU4:PRINTAB(0,0):CHR$240:CHR$241:;"TAB(10,0):CHR$242:;"TAB(10,0):"F="
TAB(0,2):"B="TAB(10,2):
260 PRINT"H="TAB(12,2):(-640-(X+32)):TAB(12,2):Y:TAB(2,0):HV:TAB(17
,0):FU:VDU5
270 #FX15,0
280 SCOLO,0:MOVEX,Y:PRINTCHR$225:
290 IF FU=0 FU=0:GOTO330
300 IF A$="Z" HV=HV+1:J=J+1:FU=FU-1
310 IF A$="X" HV=HV-1:J=J+1:FU=FU-1
320 IF A$="H" VV=VV-8:F=1:FU=FU-3
330 VDU4:PRINTAB(11,0):VV:VDU
340 Y=Y-VV:X=X+HV:IFY=900 Y=900
350 IF POINT(X,Y-32)=2 OR POINT(X+8,Y,Y)=2 OR POINT(X+16,Y-32)=2 OR POINT(X
+24,Y-32)=2 PROCRRASH
360 IF POINT(X+24,Y-32)=2 OR POINT(X+32,Y-32)=2 OR POINT(X+40,Y-32)=2 OR
POINT(X+48,Y)=2 OR POINT(X+56,Y-32)=2 PROCRRASH
370 IF ABS(640-(X+32))=40 AND POINT(X+32,Y-32)=1 PROCCLAND
380 IF Y<16 PROCRRASH
390 SCOLO,3:MOVEX,Y:PRINTCHR$225:
400 IF F=1 AND Y=80 SOUND4,-15,6,10:SCOLO,1:MOVEX,Y-32:PRINTCHR$227:
410 IF J=1 SCOLO,1:MOVEX+64,Y:PRINTCHR$228:SOUND4,-15,12,10
420 IF J=-1 SCOLO,1:MOVEX-64,Y:PRINTCHR$228:SOUND4,-15,12,10
430 IF F=1 AND Y=80 SCOLO,0:MOVEX,Y-32:PRINTCHR$227:
440 IF J=1 SCOLO,0:MOVEX+64,Y:PRINTCHR$228:
450 IF J=-1 SCOLO,0:MOVEX-64,Y:PRINTCHR$228:
460 GOTO240
470 DEF PROCRRASH
480 FORP=0 TO 255 STEP 7:SOUND43,-15,P,0:NEXT:SOUND4,-15,6,20

```

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# Open Forum

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```

490 GOTO 1:MOVEX,Y:PRINTCHR$22$;
500 FORX=1TO6:VDUI9,1,X,0,0,0:NEXT:GOTO500
510 DEF PROCCLAND
520 IF VV$B PROCGRASH
530 GOTO 3:MOVEX,Y:PRINTCHR$22$;
540 FORG=1TO11:READP,D
550 IFP=999 L=0 ELSE L=15
560 SOUND1,L,P,D:GOTO1,0,0,3:NEXT
570 GOTO570
580 DATA77,15,97,5,101,5,101,5,999,5,97,5,101,10,97,2,89,5,81,5,77,10

```

**Moon Lander**  
by Paul Driscoll

## Patterns

on BBC Micro

This program is loosely based on the random number feature of the BBC Micro. It uses high resolution graphics as well as unique sound effects. To end this program it will be necessary to press the escape key. The patterns are built up entirely of straight lines and have a range of seven different colours.

```

10 REM *****
20 REM *****
30 REM *****
40 REM *****
50 REM *****
60 REM *****
70 REM *****
80 REM *****
90 REM *****
100 REM *****
110 REM *****
120 REM *****
130 REM *****
140 REM *****
150 REM *****

```

```

160 T = 0
170 ON FNRG GOTO 490
180 S = 0
190 RNDM T
200 AGAIN:SPRINTTYPE IN ONE LETTER TO START THE
PARTIAL GENERATOR
210 RNDM S
220 RNDM T
230 L = RNDM(3)
240 CNDM D
250 S = T + L
260 VMD 19,25,0,0,0,19,1,0,0,0
270 LET R = 0
280 LET T = 1280
290 LET S = 0
300 LET W = W + 10
310 RNDM 1280,3
320 LET S = S + V
330 SOUND 11,15,5,1,45000 2,-5,800-1,1
340 IF S > 180 T = 1
350 IF T = 0 S = S + 6 ELSE S = S - 4
360 LET R = S + V
370 LET T = L + 1/1000*12800
380 LET S = 0 - 1/1000*12800
390 DRAW 3,C
400 RNDM T
410 DRAW 1280,3
420 WMD 3,1000
430 DRAW 1280,C
440 RNDM 1280,1000
450 IF S < 1000 GOTO 330
460 IF S > 1000 GOTO 330
470 RNDM 1280,1000
480 IF S < 1000 GOTO 330
490 IF S > 1000 GOTO 330
500 IF S < 1000 GOTO 330
510 IF S > 1000 GOTO 330
520 IF S < 1000 GOTO 330
530 IF S > 1000 GOTO 330
540 IF S < 1000 GOTO 330
550 IF S > 1000 GOTO 330
560 IF S < 1000 GOTO 330
570 IF S > 1000 GOTO 330
580 IF S < 1000 GOTO 330
590 IF S > 1000 GOTO 330
600 IF S < 1000 GOTO 330
610 IF S > 1000 GOTO 330
620 IF S < 1000 GOTO 330
630 IF S > 1000 GOTO 330
640 IF S < 1000 GOTO 330
650 IF S > 1000 GOTO 330
660 IF S < 1000 GOTO 330
670 IF S > 1000 GOTO 330
680 IF S < 1000 GOTO 330
690 IF S > 1000 GOTO 330
700 IF S < 1000 GOTO 330
710 IF S > 1000 GOTO 330
720 IF S < 1000 GOTO 330
730 IF S > 1000 GOTO 330
740 IF S < 1000 GOTO 330
750 IF S > 1000 GOTO 330
760 IF S < 1000 GOTO 330
770 IF S > 1000 GOTO 330
780 IF S < 1000 GOTO 330
790 IF S > 1000 GOTO 330
800 IF S < 1000 GOTO 330
810 IF S > 1000 GOTO 330
820 IF S < 1000 GOTO 330
830 IF S > 1000 GOTO 330
840 IF S < 1000 GOTO 330
850 IF S > 1000 GOTO 330
860 IF S < 1000 GOTO 330
870 IF S > 1000 GOTO 330
880 IF S < 1000 GOTO 330
890 IF S > 1000 GOTO 330
900 IF S < 1000 GOTO 330
910 IF S > 1000 GOTO 330
920 IF S < 1000 GOTO 330
930 IF S > 1000 GOTO 330
940 IF S < 1000 GOTO 330
950 IF S > 1000 GOTO 330
960 IF S < 1000 GOTO 330
970 IF S > 1000 GOTO 330
980 IF S < 1000 GOTO 330
990 IF S > 1000 GOTO 330
1000 IF S < 1000 GOTO 330

```

**Patterns**  
by Matthew Keeling

A GREAT NEW COMPETITION WORTH £THOUSANDS TO THE WINNER

## Whizz-Kid '82

Fancy your chances?

We're looking for a bright young thing who can out-shine all the commercial software houses and come up with a sparkling new program that can be marketed commercially. We want you to prove you can write a selling program and if you win the competition you'll be well on the way to making big money. The winner will receive:

1. A Dragon 32 computer.
2. Advice from *Popular Computing Weekly* on how to market and sell the winning software and how to form and finance the company to do so.
3. £2,000-worth of free advertising in *Popular Computing Weekly*.

Entries to the award scheme must be accompanied by at least four out of five of the numbered coupons published in *Popular Computing Weekly* throughout September. The closing date for the competition is October 18. The winning entry will be announced in the issue published on November 18.

### Rules

1. There is no limit on the number of entries you can send in, but each entry must be accompanied by four differently numbered competition coupons.
2. Closing date for entries is October 18, 1982.
3. The names of the winners will be announced in the November 18 issue of *Popular Computing Weekly*.
4. The Judges' decision is final.
5. No employees of Sunning Publications Ltd, or their families, will be eligible to enter the competition.

The winner will be the author who submits the most commercially viable program together with a written outline of the author's own proposals on how he would run his software house and why he would like to do it. The judge will be *Popular Computing Weekly* editor, Brandon Gore.

If a number of equally good and commercially viable programs are submitted the decision of the overall winner will be based on the best accompanying written outline of the author's proposals for running a software house.

## Popular Computing Weekly Whizz-Kid '82 Scheme

Fill in this coupon. When you have collected four differently numbered coupons, send them with your program to: *Popular Computing Weekly*, Whizz-Kid '82, Hobhouse Court, 111 Whitcomb Street, London WC2.

NAME: \_\_\_\_\_  
ADDRESS: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_



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which does the translation at the same time as running the program. There are speed advantages to the NewBrain's approach, but as, unlike most compilers, this one is interactive, it means that the lay user is unlikely to be aware of any difference.

The error messages, in my view, belong to another era. They are numbers, nearly 200 of them. I have never felt that the traditional Syntax error was an adequate response. Many newer computers, not just the BBC's, have improved their messages to the user. I know that full error messages take up valuable memory, but Error 21 and its relatives are hardly going to appeal to the first-time computer tyro.



The NewBrain really is a most extraordinary combination of crude and ultra-sophisticated features. So how, finally, does it compare with Acorn's BBC micro-computer? I think it is clear that it is by no stretch of the imagination suitable for the beginner. Not having colour and sound, its appeal to the home user will be limited, although games will undoubtedly be written for it.

What the NewBrain's designers have succeeded in creating is a kind of professional's ZX. The operating system's power will make it very attractive to software writers producing dedicated applications, and particularly those which require the use of advanced graphics. It will, of course, be configured to run CP/M when it gets its disc drives, and then a whole world of spreadsheets and similar packages will become available. ■

While the NewBrain is, strictly speaking, portable, its potential is somewhat diminished by the heavy separate power supply and the limited lifespan of its batteries. Its communication facilities are good, so there is a role for it as a peripheral intelligent terminal, speaking to its host machine via a modem down the telephone lines. As a word processor, the keyboard lets it down, but as a data-capture terminal it is nearly ideal.

But for a machine of this level of sophistication, its price is remarkably low — £199 + VAT for the basic version. This in itself represents a considerable achievement on the part of its designers.

As a challenge to the enthusiast or the professional, I have no doubts about its future popularity. Who would want one? I would. There is plenty of room in the market both for machines like this one and like the one Acorn built for the BBC.

In this slot various contributors explore different aspects of the ZX Spectrum

## Topping up characters by redefinition

*Geoff Wilkins presents a routine to redefine the Spectrum keyboard.*

How many user-defined characters can you create on a Spectrum? The Spectrum manual tells you how to make up to 21, using the user graphics included in the character-set, codes 144 to 164. But there are far more exciting possibilities using the system variable Chars, with the help of which you can redefine up to 96 characters — the whole of the keyboard between the space-character and the copyright symbol.

What you have to do is: 1) copy the data for characters in the Rom into an area of Ram; 2) alter Chars so that, instead of pointing to the Rom character-set, it points to the copy in Ram; 3) redefine the data of the Ram set as and how you like.

The following program copies the character-set, which starts at address 15616 in the Rom, to an area above Ramtop in the Ram starting at address 31744. It then pokes a new value, 123, into address 23807 (the second byte of Chars), thus giving Chars the value of 31488 (123 times 256) instead of the usual 15360 (60 times 256) — this being 256 less than the beginning of the character-set. Next, the program redefines whichever character-key you input, using eight numbers per character precisely as the manual describes redefinition of user graphics:

```
10 CLEAR 31743 : FOR A=15616 TO 16383 : POKE
A+15616, PEEK A : NEXT A
20 POKE 23807,123
30 CLS : INPUT "CHARACTER-KEY TO BE REDEFIN-
ED", K3 : IF K3="" OR K3="0" THEN GO
TO 30
40 LET P=31744+(CODE K3-32)*6
50 FOR N=0 TO 7 : INPUT "BINARY-DATA NUM-
BER FOR LINE (N+1), B : POKE P+N, B : NEXT
N
60 PRINT "NEW CHARACTER - K3 'PRESS
SPACE-KEY TO REDEFINE' - ANOTHER
CHARACTER, ANY OTHER 'KEY TO BREAK'
70 IF INKEY="" THEN GO TO 70
80 PAUSE 0.5 : IF INKEY="" THEN GO TO 80
90 CLS
```

Try running this, inputting capital 'P' for

the character to be redefined, and the numbers 1, 3, 7, 15, 31, 63, 127, 255, for the data for the new character's eight lines. You will find that capital 'P' has been redefined into a triangular graphic, even when it occurs in keywords like Print and Poke. The effect on some keywords after you have redefined a number of capitals can be quite bizarre, so you may prefer to stick to lower-case characters, but the keywords continue to work as normal, whatever their appearance.

Anyway, you can always return to the normal Rom character-set by the command: Poke 23807,60 — and Poke 23807,123 will take you back again to the new Ram set.

You can have a lot of fun just playing around with this program. Chapter 14 of the Spectrum manual explains the effect of different numbers on the new character's eight lines. You can enter them in the form BIN 01000111 or as decimal notation numbers.

You can use the program to create a new keyboard for, say, the Greek alphabet, including accents and breathings, or Pictish characters, or whatever. The new character-set is easily saved onto tape by:

```
SAVE "CHARS" CODE 31744,755
and loaded again by:
CLEAR 31743 : LOAD "CHARS" CODE 31744
POKE 23807,123
```

Do not forget, every time you run the program from line 10 you will wipe out any newly defined characters by copying the normal Spectrum set back into the Ram again. You can avoid this by running from line 20 or 30.

## Ant Hurston shows you how to play a little night music.

This little program enables you to use the Spectrum as a synthesiser, playing notes as you enter them using keys 11 to 9. Hook your machine up to the amplifier of your Hi-Fi and pretend you are Depeche Mode or the Human League.

The program first asks you to enter your note length — try starting with 0.05. You can change line 40 to play in different octaves if you wish. See you in the Top 10.

### LIST

```
5 REM SYNTHESISER*****ANT HU
RRION
10 PRINT "NOTE LENGTH " : INPUT
L:CLS
20 IF INKEY="" THEN GOTO 10
30 LET H=(CODE INKEY+4)-48:REM
N IS THEN MIDDLE C
40 BEEL,N+24:REM THE NUMBER
ADDED TO N DETERMINES OUR OC
TAVE, TRY N+12,N+35,ETC
50 GOTO 20
```

# Programming

## New solution for line deletion

*Jeremy Ruston explains how to insert and delete lines on screen.*

Recently I wrote an elementary word-processing program for the BBC computer. Part of the program offered on screen text editing, for which I needed routines to insert and delete characters and lines on the screen. The simplest way to insert and delete characters is to reprint the line on which the change is to be made. However, my solution to the problem of inserting and deleting whole lines from the display has considerably wider application.

This program demonstrates the procedures "insert" and "delete" by printing a screenful of coloured letters and then alternately opening up and deleting a line which contains the words "Happy Christmas".

Both procedures are called with three parameters. The first specifies which line of the screen is to be deleted, or where a line is to be inserted. The next parameter is one less than the number of lines per screen in the current mode and the last parameter is the number of characters per line in the current mode.

Lines 250 and 260 save the current cursor co-ordinates in X% and Y% so that the cursor can be restored at the end of the operation. Line 270 sets up a text window to stretch from the line that is to be inserted to the bottom of the screen. Line 280 moves the cursor to the top left of the window and line 290 moves the cursor one line up.

Since the cursor is already at the top of the current window, the operating system scrolls the window down, creating a blank line at the point where the insertion is required. Line 300 then destroys the window.

Line 310 increments the cursor's Y co-ordinate to ensure that the cursor is in the correct position in relation to the text on the screen. Line 320 moves the cursor to the required position before line 330 exits the procedure.

PROCDelete operates in the same manner, except that the window is scrolled up, by positioning the cursor on the bottom line of the window and printing a line feed code.

Both these routines may have to be altered to fit your application. For example, it may be better for you to move all the text above a deletion down a line, rather than vice-versa. It is also possible to run all the VDU statements in the routines into one very long statement, if you do not need to restore the cursor to its old position, you could cram each routine into a single line, dispensing with the procedures altogether.

### LIST

```
10 REM -----
20 REM   Insert and delete line
30 REM   Copyright (C) 1982
40 REM   Jeremy Ruston
50 REM -----
60 MODE 7
70 VDU 23;B20;0;0;0;
80 FOR TX=0 TO 23
90 VDU 31,0,TX
100 PRINT CHR$(128+RND(5));STRING$(38,
CHR$(65+TX))
110 NEXT TX
120 REPEAT
130 TIME=0
140 REPEAT UNTIL TIME>30
150 PROCinsert(10,39,24)
160 PRINT TAB(0,10);" Happy Christmas"
170 TIME=0
180 REPEAT UNTIL TIME>30
190 PROCdelete(10,39,24)
200 UNTIL FALSE
210 END
220 REM -----
230 DEF PROCinsert(L%,R%,B%)
240 LOCAL X%,Y%
250 XX=POS
260 YX=VPOS
270 VDU 28,0,B%,R%,L%;REM text window
280 VDU 30 :REM home cursor
290 VDU 11 :REM cursor up
300 VDU 26 :REM no windows
310 IF YX>L% THEN YX=YX+1
320 VDU 31,X%,YX :REM cursor move
330 ENDPROC
340 REM -----
350 DEF PROCdelete(L%,R%,B%)
360 LOCAL X%,Y%
370 XX=POS
380 YX=VPOS
390 VDU 28,0,B%,R%,L%;REM text window
400 VDU 31,0,B%-L% :REM cursor move
410 VDU 10 :REM cursor down
420 VDU 26 :REM no windows
430 IF YX>L% THEN YX=YX-1
440 VDU 31,X%,YX :REM cursor move
450 ENDPROC
460 REM -----
```

# Machine Code

Ian Stewart and Robin Jones present a new series for beginners

## Plus or minus? That is the question

Now that we've seen something about manipulating binary numbers let's return to looking at the way they are handled inside the machine. Usually, a number is held in a fixed number of bits, often 16 or 24 or 32, depending on the machine design. This number of bits is called the *word size* for the machine.

Let's examine what numbers could be held in a 4-bit word:

4-bit pattern	Decimal value
0000	0
0001	1
0010	2
0011	3
0100	4
0101	5
0110	6
0111	7
1000	8
1001	9
1010	10
1011	11
1100	12
1101	13
1110	14
1111	15

It's obvious why bigger word sizes are chosen in practice — a machine which can only represent the numbers 0 to 15 is unlikely to be adequate. But, there are two other problems. The notation can't represent fractional values (7.14, for instance) and it can't represent negative numbers.

We'll ignore the fractions problem, because most machine code routines only use integers, but the way in which negative numbers are dealt with is more pressing.

The technique is simple. If you've got the binary representation of a positive number and you want to create its negative equivalent you do two things.

1. Change all the 0s to 1s and all the 1s to 0s (this is rather picturesquely called "flipping the bits").
2. Add 1 to the result.

For instance, suppose you want -3:

```
3 = 0011 is a 4-bit word
Flipping the bits gives: 1100
Now add 1:
    1100
    + 1
    ----
    1101
```

So 1101 represents -3. It's called the 2's complement of 0011.

We are not going to explain exactly why this works, but you can prove to yourself that it does in any particular case like this:

If you add 3 to -3 (or if to -5 or anything to minus itself) you should get zero. So:

```
0011    (= 3)
+ 1101  (= -3)
-----
10000
```

111 (Don't forget that 1+1=0 carry 1 in binary)

So we don't get 0000 at all. But the junior 4 bits are zero, and if you are working in a 4-bit word the senior bit will just drop off the end. (For a convenient analogy, think about a car trip-meter with 3 digits — if it reads 999 and you drive an extra mile, it reads 000 and a "1" has "dropped off" the left-hand end.)

In other words we should have seen it like this:

```
0011
+ 1100
-----
0000
```

This always works, provided that the number of bits is fixed throughout. Don't forget to include leading zeroes to make up the number of bits to this standard length, before taking the 2's complement.

Let's rewrite the 4-bit table of values, now including negatives:

Decimal	Binary	2's complement	Decimal
0	0000	0000	0
1	0001	1111	-1
2	0010	1110	-2
3	0011	1101	-3
4	0100	1100	-4
5	0101	1011	-5
6	0110	1010	-6
7	0111	1001	-7
8	1000	1000	-8
9	1001	0111	-9
10	1010	0110	-10
11	1011	0101	-11
12	1100	0100	-12
13	1101	0011	-13
14	1110	0010	-14
15	1111	0001	-15

Straight away you can see that here's a problem. Every bit-pattern occurs twice so that, for instance, 1001 could mean 9 or -7. So we'll have to restrict the range of values still further.

We have drawn a dotted line around the region we actually choose to represent. If you look at the senior (leftmost) bit in each of the patterns you'll notice that it's "0" if the number is positive and "1" if the number is negative. This is obviously a very convenient distinction.

So the range of numbers we can get into a 4-bit word is -8 to +7. For 5 bits it would be -16 to +15. For 6 bits it will be -32 to +31 and so on. A 16-bit word (which is important so far as the Z80 is concerned) holds the range -32768 to +32767.

We have now dealt with positive and negative numbers. Next week we will look at how the machine crunches them. To do this, we need to understand the internal structure of the processor — its architecture.

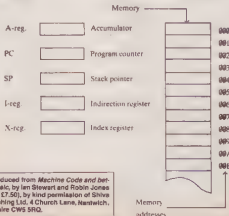
The Z80 processor is the product of some 25 years of computer development and is a fairly sophisticated beast. So it's not really a good place for the beginner to start. What we are going to do, then, is describe a simple processor, just to introduce the important concepts which are relevant to virtually all current devices.

We will suppose that our imaginary machine has a memory of 16-bit words and a number of 16-bit special-purpose registers as shown below.

### Machine Architecture

Let's look at the memory first. In Basic we could have called each of those memory locations anything we liked, but the naked machine isn't so friendly. It insists on numbering every location in an absolutely fixed way, starting at zero. These numbers are called the *memory address*. We have numbered them in hex, although you should always bear in mind that, ultimately, the coding will be in binary.

To be continued next week.



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# Peek & poke

Peek your problems to our address. Ian Beardsmore will poke back an answer.

## STACKING THE DECKS HIGH

S Wilkinson of Holcroft Road, Kingswinford, East Midlands, writes:

**Q** I ordered a ZX Spectrum about six weeks ago. While I am waiting, I would like to try writing a program, or at least re-write a program, for it. I want to do D K Allen's postman program, but I have a problem. Could you please give me the configuration for Hearts, Clubs, Diamonds and Spades. Please put them in binary form.

**A** This in fact is simple to do. All you need is an 8 x 8 grid. A nought is used for the spaces, and a one for the shaded areas. I have given their decimal numbers as well.

(Hearts)	(Clubs)
00100019 34	00001000 8
01110111 119	00011100 26
01111111 127	00101010 42
01111111 127	01111111 127
00111110 52	00101010 42
00011110 28	00001000 8
00001000 8	00011100 26
00000000 0	00000000 0
(Diamonds)	(Spades)
00001000 8	00001000 8
00011100 26	00011100 26
00111110 42	00111110 42
01111111 127	01111111 127
00111110 42	00111110 42
00011100 27	00001000 8
00001000 8	00011100 26
00000000 0	00000000 0

Throughout the program I have kept the first column, and the last line, at nought. This is to give space between characters on the screen.

## RAISING HIGH THE ROOFBEAM

M Ellick of 3 Barrington Close, Nailsea, Bristol, Avon, writes:

**Q** On several occasions your magazine has printed letters from readers complaining of long delivery times. What about yourselves?

On July 1 I sent a query to Peek & poke asking if the new Microdrive to be released by Sinclair would be usable with the ZX81. I put in a SAE for reply and as yet have had none. Even a "don't know" would be better than nothing.

**A** As I have said before, I cannot answer every letter personally. There are simply too many of them.

Instead, I try and pick let-

ters that reflect questions asked by a number of different readers. Your letter, which appeared in Peek & poke September 9, was similar to a number of other letters I received on the same subject. Rather than answer each letter individually, I picked one to stand for the rest.

There are two reasons for a delay in publishing letters. One is lack of space. The other is the time needed to research each query.

## A PRINTER'S PRICE

Richard Jones of Avon Crescent, Pelsall, Walsall, writes:

**Q** Could you please tell me how a ZX printer can be used with a Vic20 computer? Also could you give me a rough idea of how much it will cost. I have seen the July 1 issue of *Popular Computing Weekly* and I saw the Amber 3400 printer advertised. Could you tell me which would be more suited to the Vic?

**A** Several people have asked this, and though I have mentioned it before, a reprint will probably be useful for some readers. The company you want is 'Microline Software' of 235 Friern Road, Dulwich, London SE22. They do interfaces for several computers, including the Vic, BBC, AIM65 and Atom.

The interface costs £29.95 plus 50p postage and packing. You will, of course, have to buy a ZX printer. With posting and packing you are talking of a little under £95.

The address of Amber was given in that same issue of PCW, but if you missed it here it is again: Amber Controls, Central Way, Walsworth Industrial Estate, Andover, Hants.

As to which of the two is more suited to the Vic, it is more a question of which is more suited to your pocket and your taste. The Amber will be about £20 cheaper. The paper is a standard product, unlike Sinclair's which is only available from one independent source. However, I doubt if the inked ribbon for the Amber will be available from an independent source.

From my post bag there seem to be a few problems

with the Sinclair printer, particularly with very light printing. The size of the printout on the Amber is smaller, but as long as you keep a good inking ribbon in, it will probably be clearer.

## LAWING NOT ALLOWED

Ian Morrison of Pent-y-dwr, Three Crosses, Swansea, writes:

**Q** Please could you answer some queries for me about the law on software copyright. I am thinking of starting a software library for the ZX81. I have a store of 500 programs, about 50 of which were written by myself. Could you please tell me how the law stands on lending cassettes, where:

A) Software is on the original cassette.

B) Software is not on the original cassette.

C) Software is copied from a book.

D) Software is copied from a magazine.

Could you tell me if it is illegal to sell programs (taken from listings in magazines, if you credit the magazine concerned)?

I am also hoping to start a service whereby people send in programs to a software pool. If a program is accepted, the author will be given access to other programs in the pool. This may sound a little ambitious, but I feel that there is not enough exchange of information between computer enthusiasts.

**A** These questions do not just concern the ZX81. They concern the whole software business. Now that a recent government green paper has passed the buck' back into the lap of the computer industry, it is a situation that we must sort out for ourselves, and the sooner the better.

I must point out at the start that I am not a lawyer. I will attempt to give a guide to the law as it stands at the moment, but I must stress that this is just a guide.

A lot depends on whether a software cassette is regarded as a music or video tape. The Mechanical Copyright Protection Society told me that it is not illegal to use music cassettes in a library, providing you

use the original tapes. But, the Video Copyright Protection Society told me that it is illegal to use a video tape for hire, without the manufacturer's consent.

David Paterson of Silversoft said in an interview in *Popular Computing Weekly*, September 2, that there was not much that could be done about cassette libraries. I have spoken to him since then, and he told me that he was not aware of the law concerning video cassettes. The crucial question is whether software is to be regarded as music or video. Unfortunately, the courts have yet to rule on this point.

The second two points that you raise are more easily covered. Look at the front of any book and you will most likely see the following:

'All rights reserved. No part of this publication may be reproduced, stored in any retrieval system or transmitted in any form or by any means, electronic, mechanical, or photocopying, without prior permission of the copyright owner.'

Strictly speaking, this means that you are not allowed to store computer programs found in a book on a computer. This will not apply to tapes made for your own use, but it does mean that you cannot use these programs in a library without permission: this also applies to magazines.

If you feel that you want to go ahead with your library, you should start by approaching the software manufacturers. They might agree to some sort of royalty deal, but I doubt if they would let you reproduce their programs for free.

Perhaps you might try contacting one of the other libraries that has grown up. One was apparently 'represented' at the recent Microfair, though most people I talked to did not seem to have noticed it.

Whatever happens in the next few months will need to be watched very carefully, as it will effect everyone who sells or buys software, especially games software.

Send your questions to Peek & poke, *Popular Computing Weekly*, Highbury Court, 19 Whitcomb Street, London WC2 7HF.

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## ANCIENT ALGORITHMS

PUZZLE NO24

by Tony Roberts



1. TAKE an alligator jawbone ... and a stone for the first tooth .....

© Tony Roberts 1984 (22)

2. IF there are no more teeth in the jawbone ... STOP.

3. FIND an extra stone for each stone you hold



4. IF the next tooth is missing ... Go to 2. otherwise pick up a new stone, add it to the others and return to 2.



Q. WHAT ARE YOU CALCULATING?

## Solution to Puzzle No 20

In the first of the Ancient Algorithms the cavewoman has been calculating the highest common factor (or as one entrant had it — highest com factor) of the number of stones in the original heaps via an iterative loop. In Basic the process would be represented by:

```
10 INPUT A,B
20 IF A > B THEN A = A - B ELSE B = B - A
30 IF A * B > 0 THEN 20
```

## 40 PRINT A + B

This algorithm is known as a Euclidean algorithm for greatest common divisor by repeated subtraction. No prizes to the entrant who solved the puzzle using a packet of Opal Fruits!

## Winner of Puzzle No 20

The winners are: Heather and Michael Devine, 12 Greenhaven Rise, Llandough, Penarth, S. Glamorgan, who receive £10.

## Rules

The winner of the puzzle will be the reader who, in the opinion of *Popular Computing Weekly*, has submitted the best solution. Preference will be given to solutions which show how the entrant arrived at the correct answer. Envelopes containing entries should be clearly marked "PUZZLE". The closing date for the competition is Tuesday October 5. The judges' decision is final.

## VIN AUTOMATIQUE

## A.R.T.H.U.R.

Lauren Laver & Joan Marshall  
Designed by the authors. Printed in Great Britain

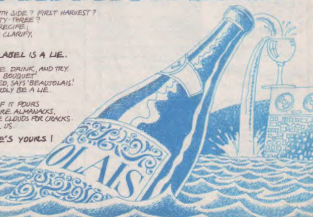
BEAUTIDLAIS? FORTY-NINE? SOUTH SIDE? FIRST HARVEST?  
CERTAINLY SIR. OR MIDOC. SIXTY-THREE?  
I SET THE DIALS. I KNOW THE RECIPES!  
I BLEND AND FILTER, RACK AND CLARIFY,  
AND CHOOSE THE LABEL.

- THE LABEL IS A LIE.

THE LABEL'S YOUR EXPERIENCE DRINK, AND TRY.  
IT WILL NOT TASTE OF METAL, ITS BOUQUET  
MEASURED, MATURED, CONTROLLED, SAYS 'BEAUTIDLAIS'.  
WHAT TASTES LIKE TRUTH CAN HARDLY BE A LIE.

AND NOW IT DOESN'T MATTER IF IT POURS  
ALL SPRING AND SUMMER... NO MORE ALMANACKS,  
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